Quiz 12.1-12.2 Tues.

## Precalc 12.3

Find the limit of the terms of an infinite sequence Find the sum of an infinite geometric series Use <u>limits</u> to write the fraction form of a repeating decimal

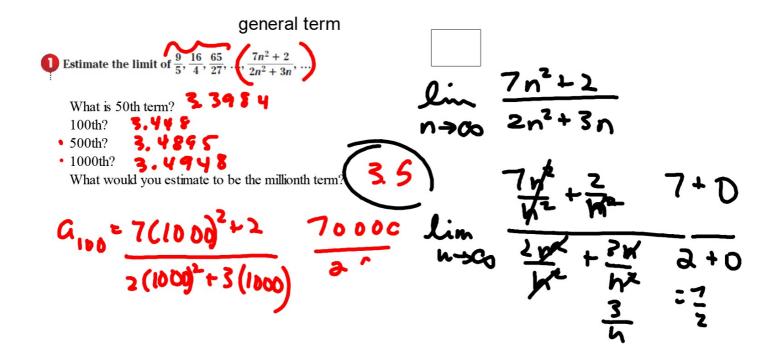
geometric sequence

common ratio

geometric series

finite sequence specific no. of terms

9 Y 
$$\frac{1}{7}, \frac{7}{4}, \frac{7}{16}, \frac{7}{64}, \frac{7}{256}, \dots$$
 What is the rule?  
 $a_{10} = 7(\frac{1}{4})^{9} = 0.000026703$   
 $a_{50} = 7(\frac{1}{4})^{9} = 2.2 \times 10^{-29}$   
 $a_{100} = 7(\frac{1}{4})^{99} = 1.74 \times 10^{-69}$   
 $a_{100} = 7(\frac{1}{4})^{99} = 0$ 



## Too intimidating, note page number

## P.776



Theorems for Limits

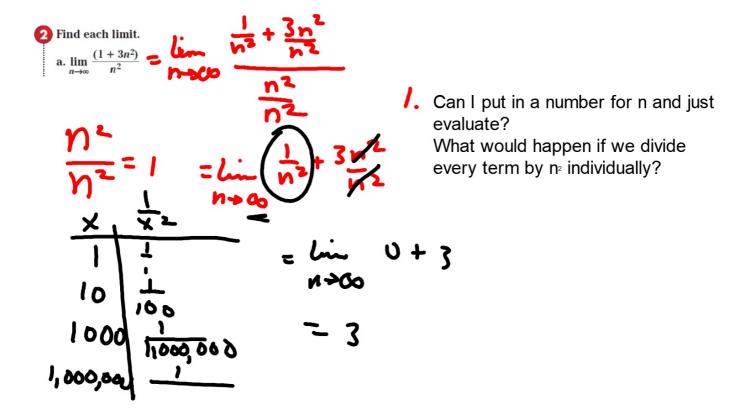
If the  $\lim_{n\to\infty}a_n$  exists,  $\lim_{n\to\infty}b_n$  exists, and c is a constant, then the following theorems are true.

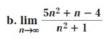
Limit of a Sum 
$$\lim_{n\to\infty} (a_n + b_n) = \lim_{n\to\infty} a_n + \lim_{n\to\infty} b_n$$

Limit of a Difference 
$$\lim_{n\to\infty} (a_n-b_n) = \lim_{n\to\infty} a_n - \lim_{n\to\infty} b_n$$

Limit of a Quotient 
$$\lim_{n\to\infty}\frac{a_n}{b_n}=\frac{\lim\limits_{n\to\infty}a_n}{\lim\limits_{n\to\infty}b_n}$$
, where  $\lim\limits_{n\to\infty}b_n\neq 0$ 

Limit of a Constant  $\lim_{n\to\infty} c_n = c$ , where  $c_n = c$  for each n

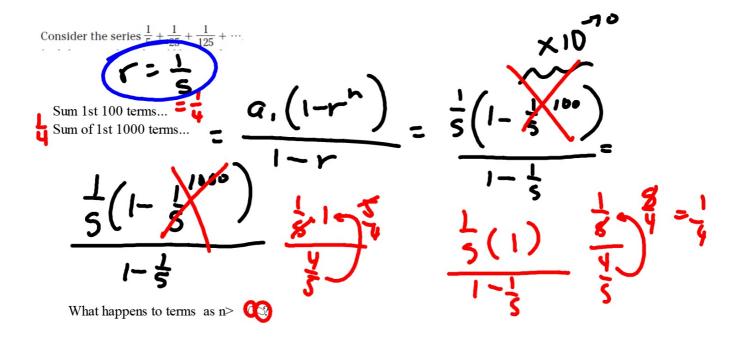




divide each term by highest degree in denominator

3 Find each limit.

a. 
$$\lim_{n\to\infty} \frac{2+5n+4n^2}{2n}$$
 $\frac{2}{n^2} + \frac{5n}{n^2} + \frac{4n}{n^2}$ 
 $\frac{2}{2n}$ 
 $\frac{2}{n^2} + \frac{5n}{n^2} + \frac{4n}{n^2}$ 
 $\frac{2}{n^2} + \frac{4n}{n^2} + \frac{4n}{n^2}$ 



$$S_n = \frac{a_1(1-r^n)}{1-r}$$

Compare to finite series...
Notice r



1- <1

Sum of an Infinite Geometric Series

The sum S of an infinite geometric series for which |r| < 1 is given by

$$S = \frac{a_1}{1 - r}.$$

**Example** 4 Find the sum of the series  $21 - 3 + \frac{3}{7} - \cdots$ .

Can you? (find r)
$$\frac{21}{1--\frac{1}{7}} = \frac{21}{1+\frac{1}{7}} = \frac{21}{8}$$

12.3